

Claims:

1. A gateway for using non-IP digital PBX telephone handsets with an IP call controller, comprising:
  - (a) one or more handset ports for coupling to one or more non-IP digital PBX telephone handsets;
  - (b) an IP port for coupling to an IP network device; and
  - (c) a protocol translator circuit that
    - (i) translates non-IP digital PBX telephone call control signals received at a handset port into IP telephone call control signals for an IP telephone call controller and delivers them to the IP port; and
    - (ii) translates IP telephone call control signals received at the IP port from an IP telephone call controller into non-IP digital PBX telephone call control signals and delivers them to the one or more handset ports.
2. The gateway of claim 1 wherein the protocol translator circuit is programmable such that it can be programmed to operate properly with each of a plurality of protocols for non-IP digital PBX telephone call control signals.
3. The gateway of claim 1 wherein the protocol translator circuit is programmable such that it can be programmed to operate properly with each of a plurality of protocols for IP telephone call controllers.
4. The gateway of claim 2 wherein the protocol translator circuit is programmed by IP download via the IP port.
5. The gateway of claim 3 wherein the protocol translator circuit is programmed by IP download via the IP port.
6. The gateway of claim 4 wherein the download is initiated in response to establishment of an IP session between the gateway and an IP service.
7. The gateway of claim 5 wherein the download is initiated in response to establishment of an IP session between the gateway and an IP service.
8. The gateway of claim 1 wherein, upon receipt at a handset port of one or more predetermined non-IP digital PBX call control signals, instead of or in addition to translating

the signal into an IP telephone call control signal, the protocol translator circuit returns a non-IP digital PBX call control signal to the handset port.

9. The gateway of claim 1 wherein the one or more non-IP digital PBX handset ports includes a first handset port and a second handset port wherein, upon receipt at the first  
5 handset port of one or more predetermined non-IP digital PBX call control signals, instead of or in addition to translating the signal into an IP telephone call control signal, the protocol translator circuit sends a non-IP digital PBX call control signal to the second handset port.

10. The gateway of claim 9 wherein the call control signals are for establishing a voice conference that includes the first and the second handset ports.

10 11. The gateway of claim 1 further comprising an address registration circuit that assigns an address for IP communications to each handset port to which a non-IP digital PBX telephone is coupled and registers each address for IP communications with the IP telephone call controller.

15 12. The gateway of claim 1 further comprising a registration circuit that registers the gateway with the IP telephone call controller for subsequent system management.

13. The gateway of claim 1 further comprising a general purpose IP router coupled to the IP port and to one or more IP sub-ports in the gateway for coupling other IP devices to the IP network, where the router gives voice quality preference to IP packets going to or from the one or more telephone handset ports over IP packets going to or from devices coupled to  
20 the one or more IP sub-ports.

14. The gateway of claim 1 having an external form of a plug-in card for an IP telephone call controller where the IP port has an external form for coupling to contacts in said IP telephone call controller.

25 15. A system wherein non-IP digital PBX telephone handsets are coupled to an IP telephone call controller in a public telephone network, comprising:

(a) an IP telephone call controller operating a public telephone network according to public IP call control protocols and coupled to the global IP network;

(b) a gateway coupled to the global IP network at a location remote from the IP telephone call controller;

- (c) one or more non-IP digital PBX telephone handsets coupled to the gateway via wires for carrying non-IP digital PBX telephone call control signaling between the handset and the gateway;
- (d) the gateway having one or more protocol translating circuits that:
- 5           (i) translate non-IP digital PBX call control signals received from a handset into IP call control signals according to the public IP call control protocols of the call controller and
- (ii) translate IP call control signals from the call controller into non-IP digital PBX call control signals for a handset coupled to the gateway.
- 10   16. The system of claim 15 wherein the gateway further comprises a general purpose IP router coupled to the IP port and to one or more IP sub-ports in the gateway for coupling other IP devices to the global IP network, where the router gives voice quality preference to IP packets going to or from the one or more telephone handsets over IP packets going to or from devices coupled to the IP sub-ports.
- 15   17. A system wherein non-IP digital PBX telephone handsets are coupled to a proprietary IP telephone call controller in a private telephone network, comprising:
- (a) a proprietary IP telephone call controller operating according to proprietary IP call control protocols and coupled to the global IP network;
- (b) a gateway coupled to the global IP network at a location remote from the call controller;
- 20           (c) one or more non-IP digital PBX telephone handsets coupled to the gateway via wires for carrying non-IP digital PBX telephone call control signaling between the handset and the gateway;
- (d) the gateway having one or more protocol translating circuits that:
- 25           (i) translate non-IP digital call control signals received from a handset into IP call control signals according to proprietary IP call control protocols of the call controller and
- (ii) translate proprietary IP call control signals from the call controller into non-IP digital call control signals for a handset coupled to the gateway.
- 30   18. The system of claim 17 wherein the gateway further comprises a general purpose IP router coupled to the IP port and to one or more IP sub-ports in the gateway for coupling

other IP devices to the global IP network, where the router gives voice quality preference to IP packets going to or from the one or more telephone handsets over IP packets going to or from devices coupled to the IP sub-ports.

19. A system wherein non-IP digital PBX telephone handsets are coupled to a gateway in the form of a plug-in card in a proprietary IP telephone call controller in a private telephone network, comprising:

- (a) a proprietary IP telephone call controller operating according to proprietary IP call control protocols and coupled to the global IP network;
- (b) a gateway card plugged into the call controller;
- 10 (c) one or more non-IP digital PBX telephone handsets coupled to the gateway card via wires for carrying non-IP digital PBX telephone call control signaling between the handset and the gateway card;
- (d) the gateway card having one or more protocol translating circuits that:
  - 15 (i) translate non-IP digital call control signals received from a handset into IP call control signals according to proprietary call control protocols of the call controller and
  - (ii) translate proprietary IP call control signals from the call controller into non-IP digital call control signals for a handset coupled to the gateway.

20. A method in a telephone IP gateway for programming the gateway to work with non-IP digital PBX telephone handsets, comprising:

- (a) receiving at a port for non-IP digital handsets a signal from a connected handset;
- (b) based on the signal, sending to a remote IP server via an IP port in the gateway information identifying the handset; and
- 25 (c) receiving from the server programming information for the gateway to cause the gateway to work with the handset.

21. The method of claim 20 wherein the information identifying the handset is the signal received from the handset.

22. The method of claim 20 wherein the information identifying the handset is selected from a memory in the gateway based on the signal received from the handset.

23. The method of claim 20 wherein the method is initiated in response to establishment of an IP session between the gateway and an IP service.
24. A method in a telephone IP gateway for programming the gateway to work with a particular IP telephone call controller, comprising:
- 5 (a) receiving at an IP port a signal from an IP telephone call controller;
  - (b) based on the signal, sending to a remote IP server via the IP port information identifying the call controller; and
  - (c) receiving from the server programming information for the gateway to cause the gateway to work with the IP telephone call controller.
- 10 25. The method of claim 24 wherein the information identifying the call controller is the signal received from the call controller.
26. The method of claim 24 wherein the information identifying the call controller is selected from a memory in the gateway based on the signal received from the call controller.
27. The method of claim 24 wherein the method is initiated in response to establishment of an IP session between the gateway and an IP service.
- 15 28. A method in a telephone IP gateway for implementing a call control function, comprising:
- (a) receiving from a non-IP digital telephone handset coupled to the gateway a command to perform a call control function;
  - (b) in response, sending a call control signal back to the non-IP digital telephone handset and no signal to a call controller.
- 20 29. The method of claim 28 wherein the function is placing a call on hold.
30. A method in a telephone IP gateway for implementing a call control function, comprising:
- (c) receiving from a non-IP digital telephone handset coupled to the gateway a command to perform a call control function;
  - (d) in response, sending a call control signal to a second non-IP digital telephone handset coupled to the gateway.
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31. The method of claim 30 wherein the function is a voice conference including the first handset, the second handset, and one or more IP voice streams entering the gateway from the IP network.

32. The method of claim 30 wherein the function is a call transfer from the first handset to  
5 the second handset.

33. The method of claim 30 wherein the function is a voice connection between the first handset and the second handset.